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DEVICE FOR SAVING FUEL AND REDUCING EMISSIONS

TECHNICAL FIELD

This invention relates to a device for saving fuel in combustion engines and reducing emissions, e.g. gaseous emissions to the atmosphere.

BACKGROUND ART

This invention relates particularly but not exclusively to a device for saving fuel and reducing emissions for use on internal combustion engines, e.g., normally aspirated engines and engines with fuel injectors. It will therefore be convenient to describe the invention with reference to these example applications.

However, it is to be clearly understood that the invention is capable of broader application.

For example, the invention can be applied to any combustion engine and not just motor vehicle engines.

Incomplete combustion of liquid fuels increases the cost of running engines. Further unburned fuel e.g. hydrocarbons are vented to the atmosphere through the exhaust and are generally harmful to the atmosphere.

Some of the gases emitted into the atmosphere include carbon monoxide, various nitrogen oxides, and unburned hydrocarbons.

Naturally therefore any device which acted to decrease fuel consumption and thereby lower the running costs of a vehicle as well as lowering the pollution released to the atmosphere would be a major advance in the art and would be most advantageous to society generally.

International patent application No. PCT/AU01/00585 describes a fuel saving device including a support which mounts a plurality of magnets in opposed polarities provided in a number of embodiments which enable the device to be incorporated in the fuel system of combustion engines with resulting fuel savings and a reduction in emissions.

It is generally agreed that there is strong evidence of a positive effect when carbon based liquid and gaseous fuels are magnetically influenced.

It is also generally agreed that there is a possibility that the "air" (and probably specifically the O_2 atoms within air) is influenced positively in terms of its ability combine with the gasoline particles.

Our tests to date have shown to our satisfaction that although gasoline can be influenced by magnetic fields arranged in particular alignments and cross alignments, the greatest influence is achieved when the air is treated either individually or in conjunction with the gasoline at the point where the air and gasoline mix.

As a result of researching available data, and our own on-going practical testing observations and recordings, we believe that the fuel that combusts in an engine is not just the gasoline, but is the combination of gasoline and air. This distinction becomes important in understanding where the influence of a magnetic field may be most dominant. Any reference to fuel in this document means "the combination of gasoline and air".

The magnetic influences and/or effects that are most likely to be influencing the gasoline/air mix going into the combustion chamber of the engine include the viscosity of the fluid particles of the fuel.

Practical testing carried out in our research facility in 2002 proved that the introduction of magnetic fields with particular alignments and cross alignments, positively affects the ability of gasoline fluid particles to atomise to a greater extent, into air. The fluid particles of the gasoline/air mix, became smaller and lighter.

There is no assertion as to any particular effect of magnetic influence on the gasoline prior to the point of atomisation in air. It should however be noted that Hans Dehmelt of the University of Washington, Seattle, in his 40 years of research into the basic properties of electrons showed that the electron has only four known characteristics: mass, charge, spin and magnetism. The magnetic effects seen on a daily basis, and employed in this device relate to ferromagnetic interaction. When we talk about "non-magnetic", we are actually saying non-ferromagnetic as there is no reaction with ferrite based substances. The recognition of "non-ferromagnetic forces" that are none the less magnetic, is a direct result of Dehmelt's work and their influences, although proven to exist, are yet to be quantified.

General laws of physics imply that the smaller the particle, the less surface tension, and, the decreased weight of that particle allows for an increased "suspension" time in the air as it travels the distance through the intake manifold from the area of magnetic influence, to the combustion chamber.

The fuel velocity through the intake manifold is influential in keeping fluid particles suspended in the air and this ability is enhanced if the fluid particles are smaller and lighter. The greater the amount of fluid in fine suspension on reaching the combustion chamber, the greater the fluid surface area exposed to air at the point of combustion. This has a positive effect on the rate of burn and the completeness of that burn.

The result is that more power is generated from the same amount of fuel, and with a more efficient burn less harmful gases are exhausted from the engine.

As the main requirement for combustion to occur in this situation is the presence of oxygen (O_2), it seems logical to deduce that the most influential part of the air portion of fuel, is the O_2 molecule.

Practical testing has been carried out in our research facility to identify the influence of magnetic fields on air before it mixes with gasoline to become "the fuel".

There is strong evidence to suggest that "air" (or more likely, specifically the O_2 molecule in air) is susceptible to magnetic influence and may be the more dominant of the effected fuel components of gasoline and air.

The magnetic field patterns which are created by fuel saving devices such as that discussed by international patent application no. PCT/AU01/00585, are important and we conclude that multidirectional fields are more successful than orderly single line fields and that the devices may need to be arranged in different ways to best suit particular engines.

It is thus an object of the present invention to provide improvements to fuel saving devices which may at least partially overcome at least one of the abovementioned disadvantages or provide the consumer with a useful or commercial choice.

Further objects and advantages of the present invention will become apparatus from the ensuing description which is given by way of example.

In one form, the invention resides in a fuel saving device comprising a disc-like non-magnetic solid support body having at least one flow opening therein and a continuous periphery which adapts the support body for positioning within a sealed air/fuel environment of a fuel system of a combustion engine at an air/fuel

mixing point within the fuel system in a manner in which the longitudinal axis of the at least one flow opening is co-axial with fluid flow paths within the air/fuel environment, a plurality of permanent magnets having opposed polar axes supported by the periphery and positioned to provide at least one magnetic field across the at least one flow opening in the support body, and at least one booster magnet associated with the at least one flow opening.

Suitably, the plurality of peripherally mounted magnets will be mounted in the same plane, that is, the disc-like non-magnetic solid support body will generally be a substantially planar body.

The booster magnet will generally be positioned in substantially the same plane as the plurality of permanent magnets.

The plurality of magnets is suitably keyed into the periphery of the body and each has a magnetic face which extends to and is communicable with the at least one flow opening.

The support body is suitably provide with a plurality of apertures therein to facilitate the mounting of the support body in a fuel/air line leading to a combustion chamber of an internal combustion engine.

The support body may be provided with top and bottom cover plates which secure the magnets against displacement via top and bottom surfaces of the support body.

There is preferably an even number of magnets keyed into the periphery of the body with the poles of opposite pairs of the magnets reversed relative to each other.

According to a most preferred embodiment, the device, as adapted for use in association with a single-throat carburetor, has four magnets spaced substantially equidistantly about the circumference of the central opening in the support body, arranged at approximately 90° apart from each other.

A further preferred embodiment of the device has six magnets spaced substantially equidistantly about the circumference of a substantially oval shaped central opening in the support body.

The booster magnet may be oriented with the polar axis of the magnet being oriented such that the negative pole of the magnet is on the outlet side of the

device.

The inventors have found that in addition to defining an annular magnetic field around the central magnet, the fact that the central magnet is present places an obstruction in the flow path of the air/fuel mixture as it passes through the opening. This may result in at least radial mixing of the air/fuel mixture and will generally result in longitudinal mixing as well. The mixing characteristics of the air/fuel mixture as it passes through the opening may overcome the plug flow characteristics present in prior art devices.

Plug flow is characterised by the fact that the flow of mixture through the device is orderly with no element of fluid overtaking or mixing with any other element ahead or behind it. In a plug flow situation, the degree of treatment of the mixture varies from point to point along a flow path, with a given mixture element being treated only once as it passes through the magnetic fields caused by the device. The present invention may promote at least radial and some longitudinal mixing of the air/fuel mixture which results in the possibility that a given mixture element pass through the magnetic fields caused by the device more than once, thus enhancing treatment.

In addition to this, prior art devices promote a convex air/fuel mixture flow profile due to the boundary layer caused by in the pipe and opening. This results in a larger amount of the mixture passing through the middle of the opening as compared to the periphery of the pipe. As the magnets of the prior art devices are located around the periphery of the opening, this resulting magnetic field is strongest or most effective closest to the magnets, that is closest to the periphery of the opening, and weakest in the centre of the opening as the field is active over the width or diameter of the opening. Therefore, in prior art devices, the majority of the air/fuel mixture is treated or affected by a weaker part of the magnetic field.

By providing the obstruction in the flow path of the air/fuel mixture as it passes through the opening of the present invention, the central magnet may disrupt the flow profile and force the fluid mixture to pass through or across the more effective portion of the magnetic field, thus enhancing treatment of the mixture. It may also have the effect of decreasing the width or diameter of the opening over which the magnetic field must span. The width of the opening may be effectively

halved allowing the magnetic fields to be "shorter" and thus increase effectiveness.

Still further, the magnetic field may be increased in dimension in the longitudinal direction of the device due to the provision of the central magnet.

BRIEF DESCRIPTION OF THE DRAWINGS

Aspects of the present invention will now be described with reference to the accompanying drawings in which:

FIGURE 1 is a top perspective view of a fuel saving device according to one aspect of the present invention, and

FIGURE 2 is a top view of a fuel saving device according to another aspect of the present invention, and

FIGURES 3 and 3a are diagrammatic lines of flux created by the devices of figures 1 and 2, and

FIGURE 4 of the drawings is a plan view of a device according to a further aspect of the present invention adapted for multiple throat carburetors.

With respect to figure 1 of the drawings, the fuel saving device illustrated comprises a hexagonal shaped non-magnetic body 1 supporting a plurality of permanent magnets 2 (preferably 2 to 6), the body illustrated being constructed in two halves or having a central core and top and bottom cover plates.

The magnets 2 face a central aperture 3 and have opposed polarities as described in the abovementioned international patent application.

In this case however, the magnets extend only partially throughout the depth of the body and stop short of the top wall of the body by a distance "S".

Such an arrangement provides the option of moving the magnetic field further away from the base of a carburetor and increasing the area of magnetic influence between the point of gasoline atomization and the point of cessation of magnetic influence.

With respect to figure 2 of the drawings, the device of figure 1 is modified to include a centrally positioned magnet 5 supported by a grate (not shown) with a magnetic field running transverse to the main magnets. The magnetic field created by the additional central magnet causes an increased 3D effect.

The polarity of the central magnet 5 is negative down.

Figures 3 and 3a of the drawings show respectively the magnetic fields

generated by the device of figure 1 and the device of figure 2.

With respect to figures 3 and 3a, in figure 3, there occurs a predominant plane of magnetic forces, parallel to the plane of the plurality of magnets, indicated by arrow 6 associated with magnetic lines of force which are perpendicular to the plane of the plurality of magnets, indicated by arrow 7. The direction of fuel is indicated by arrow 8. In figure 3, the central magnet, indicated by arrow 9 influences the magnetic forces to the extent that the perpendicular lines of force are increased in length.

The devices described have been shown to provide significant reductions in fuel consumption and significant reduction in emissions.

With respect to figure 4 of the drawings, a device for fitment to multiple throat carburetors comprises a body 10 constructed similarly to the devices previously described.

The body 10 is provided with mounting apertures 11 to suit a selected carburetor and is interposed between the carburetor and the air/fuel mixture of a system.

The body 10 is provided with primary and secondary passages 12.

Two magnets 13 having opposed polarities as indicated are positioned in the body facing the passages 12 at approximately ninety degree spacing.

A further magnet 13a is positioned adjacent each of the smaller passages 12a.

A mild steel plate or further magnet 14 is placed between the larger pair of passages 12b.

The device illustrated generates similar magnetic fields to that described for the previous embodiments.

The devices described have been shown to provide significant reductions in fuel consumption and significant reduction in emissions.

In this regard, a number of experiments have been conducted as a proof of concept of the invention. The results of a sample of said experiments are presented below in tabular form.

Example 1 – Conducted using a 1984 Mustang V8 engine with 4 Barrel Carburetor. Engine at <u>Idle</u>

Results

Emission Constituent	**Value - No Device**	**Value – Device Fitted**	**Percentage (Increase)/Decrease**
Hydrocarbons	380 ppm	162 ppm	57
Carbon Monoxide	3.41%	0.97%	69
Carbon Dioxide	12.90%	14.60%	(13)
NO	17 ppm	11 ppm	35
Oxygen	0.00%	0.04%	4

Example 2 – Conducted using a 1984 Mustang V8 engine with 4 Barrel Carburetor. Engine at <u>1600 to 1660 rpm</u>

Results

Emission Constituent	**Value - No Device**	**Value – Device Fitted**	**Percentage (Increase)/Decrease**
Hydrocarbons	103 ppm	49 ppm	52
Carbon Monoxide	2.10%	0.20%	90
Carbon Dioxide	10.60%	12.4%	(17)
NO	58 ppm	38 ppm	34

Example 3 – Conducted using a 1984 Mustang V8 engine with 4 Barrel Carburetor. Engine at <u>1640 to 1680 rpm</u>

Results

Emission Constituent	**Value - No Device**	**Value – Device Fitted**	**Percentage (Increase)/Decrease**
Hydrocarbons	214 ppm	49 ppm	77
Carbon Monoxide	6.08%	1.24%	79
Carbon Dioxide	8.20%	11.60%	(41)
NO	98 ppm	31 ppm	68

Example 4 – Conducted using a Volkswagen Beetle engine with Carburetor at engine Temperature of 80°C. Drive Cycle engine running at various road speeds according to IM240 test.

Results 0-20 mph

Emission Constituent	Value - No Device	Value – Device Fitted	Percentage (Increase)/Decrease
Hydrocarbons	468 ppm	257 ppm	52
Carbon Monoxide	1.01%	0.62%	90
Carbon Dioxide	12.56%	12.89%	(17)
NO	345 ppm	295 ppm	34
Oxygen	1.98%	2.15%	(8)

Results 21-40 mph

Emission Constituent	Value - No Device	Value – Device Fitted	Percentage (Increase)/Decrease
Hydrocarbons	231 ppm	192 ppm	52
Carbon Monoxide	0.54%	0.47%	90
Carbon Dioxide	12.97%	12.84%	(17)
NO	659 ppm	606 ppm	34
Oxygen	2.30%	2.31%	(0.4)

Results 41-60 mph

Emission Constituent	Value - No Device	Value – Device Fitted	Percentage (Increase)/Decrease
Hydrocarbons	267 ppm	162 ppm	52
Carbon Monoxide	0.35%	0.31%	90
Carbon Dioxide	13.33%	13.48%	(17)
NO	1465 ppm	1292 ppm	34
Oxygen	1.60%	1.65%	(3)

Where it is used above, the symbol "NO" is used in a generic sense to mean oxides of nitrogen generally as opposed to its strict sense which is nitric oxide.

As can be seen from the above examples, use of a device according to the invention generally results in a marked decrease in the level of unburnt hydrocarbons in the exhaust stream from the engine. It also leads to a decrease in the level of carbon monoxide and oxides of nitrogen in the exhaust stream from the engine. Use of the device according to the invention also results in an increase in the level of oxygen in the exhaust stream. An implication of this can be seen to be that the combustion of the hydrocarbons in the engine is more efficient resulting in a lower level of unburnt hydrocarbons in the exhaust stream and more efficient use of oxygen resulting in less oxygen being used in the combustion process.

It will of course be realised that the above has been given by way of illustrative examples of the invention and that all such modifications and variations thereto as would be apparent to persons skilled in the art are deemed to fall within the broad scope and ambit of the invention.

In the present specification and claims, the word "comprising" and its derivatives including "comprises" and "comprise" include each of the stated integers but does not exclude the inclusion of one or more further integers.

Reference throughout this specification to "one embodiment" or "an embodiment" means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, the appearance of the phrases "in one embodiment" or "in an embodiment" in various places throughout this specification are not necessarily all referring to the same embodiment. Furthermore, the particular features, structures, or characteristics may be combined in any suitable manner in one or more combinations.